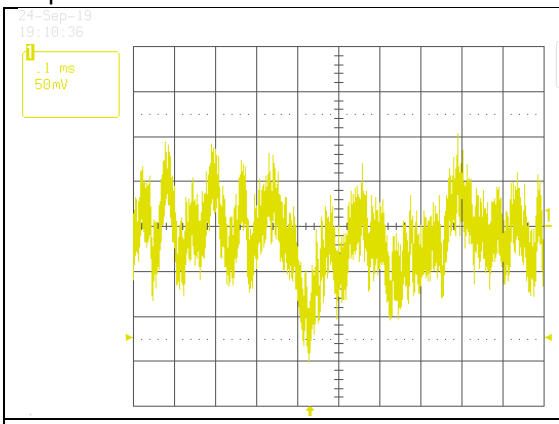
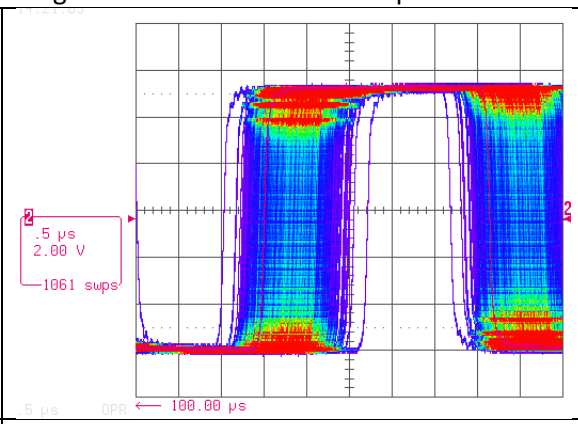
UCC256302 frequency stability issue

Problem description

Output noise from LLC converter is unstable when using UCC256302 IC as shown in plot below.

	
Output noise.	Frequency jitter = +/-0.5uS for 100uS period. Fsw approximately 180khz

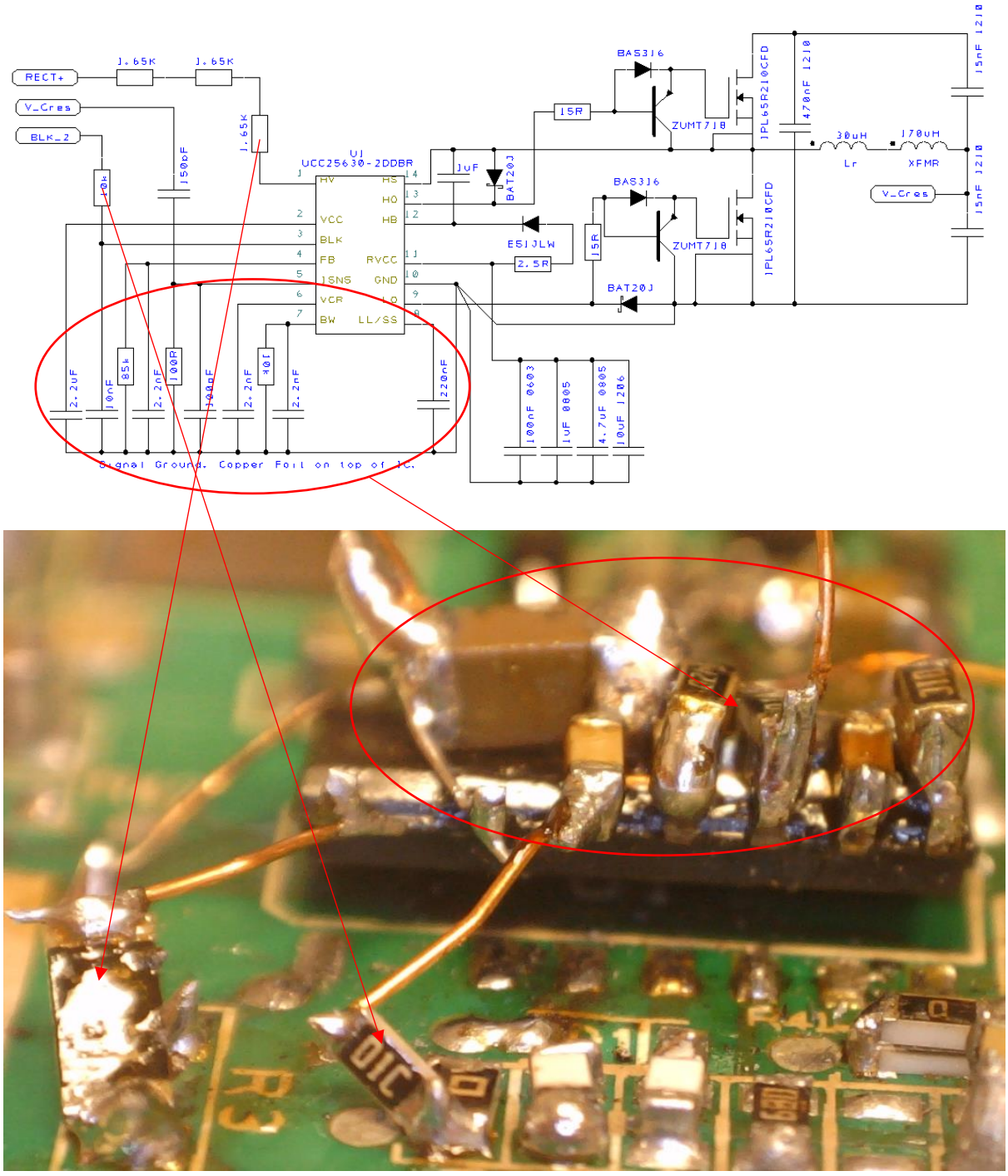
The original circuit was modified to try to identify to noise source. The modifications are described below.

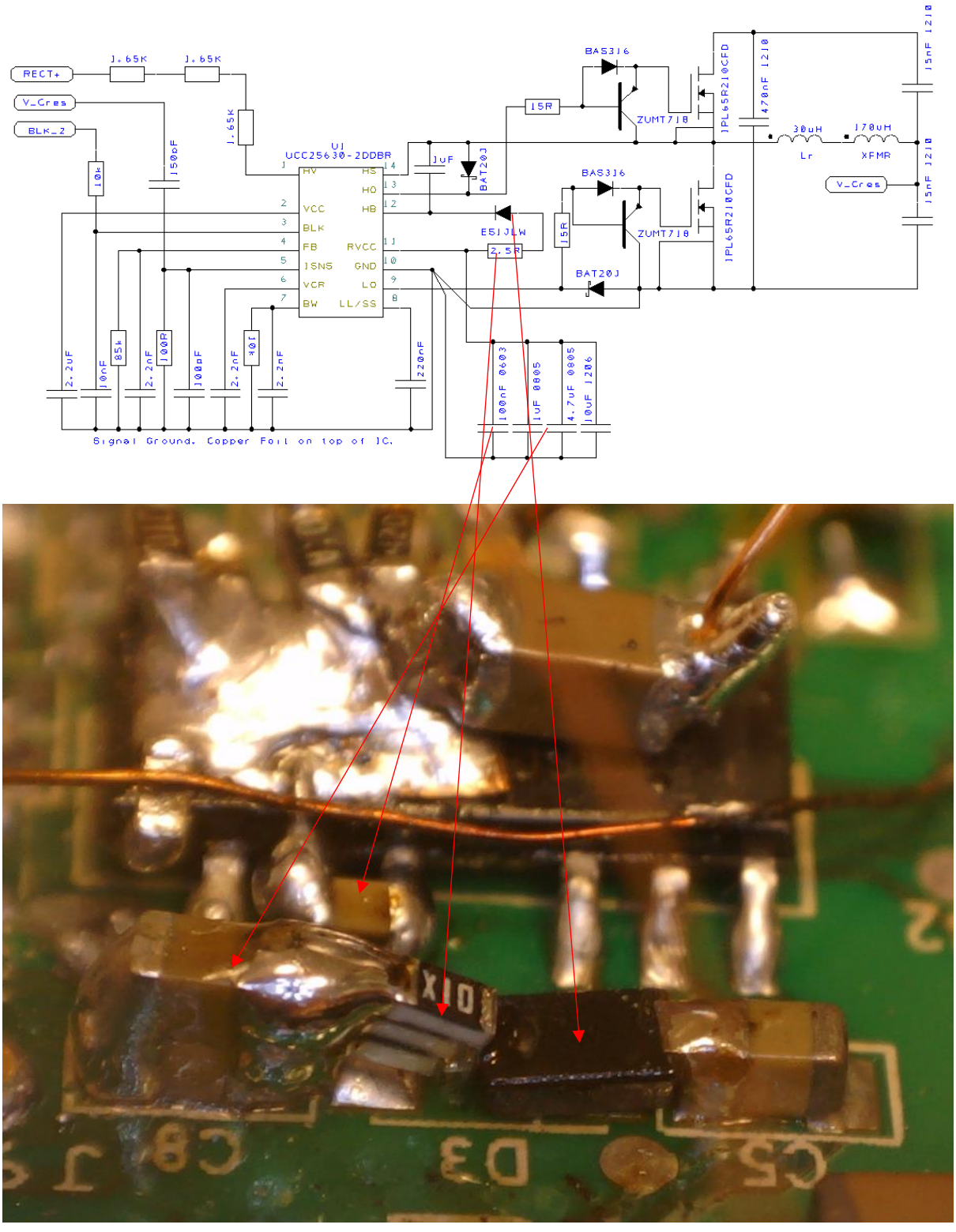
- To eliminate the possibility of control loop issue, the IC is run open loop with just 85k 0603 resistor and 2.2nF 0603 ceramic capacitor from FB to GND.
- To eliminate the possibility of layout issue, a copper foil plane is made on top of the IC body and connected directly to GND pin. The following pins are connected to this ground plane and decoupled with ceramic capacitors.
  LL/SS, BW, VCR, ISNS, BLK, VCC.
- VCR is run in oscillator mode (no feed from resonant capacitor voltage)
- RVcc has additional decoupling 100nF + 1uF, + 4.7uF + 10uF ceramic capacitors
- HV pin is lifted to eliminate any capacitance (as per layout guidelines)

See following pages for schematic and physical layout.

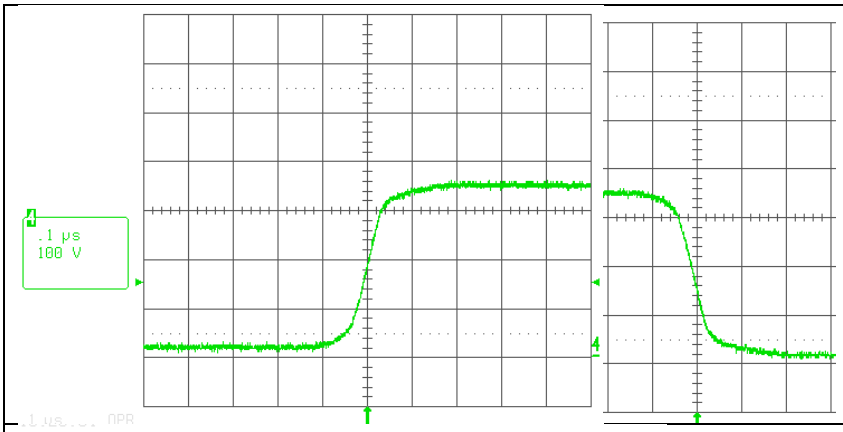
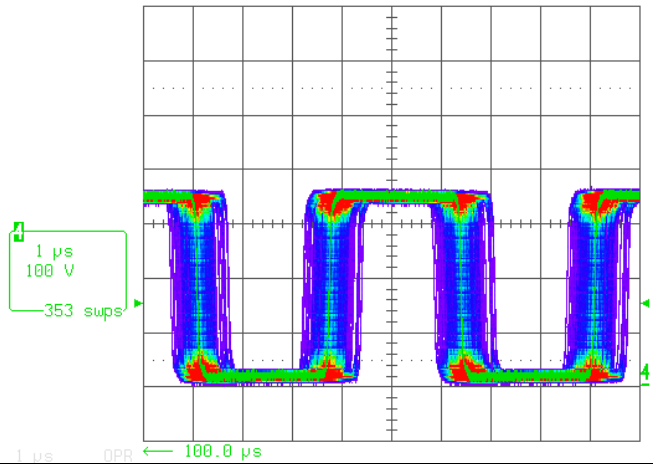
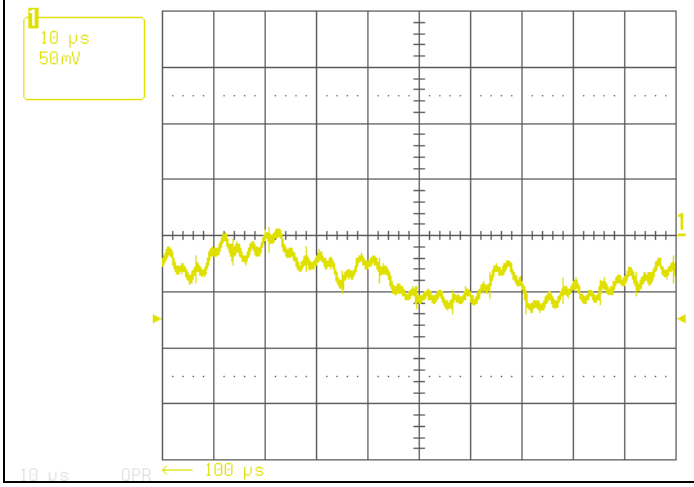
Even with these modifications, significant frequency jitter can still be observed.

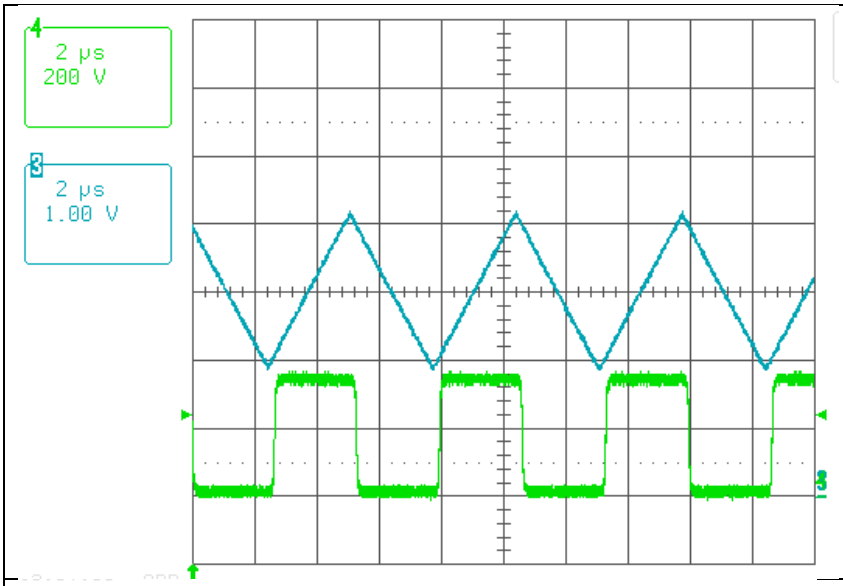
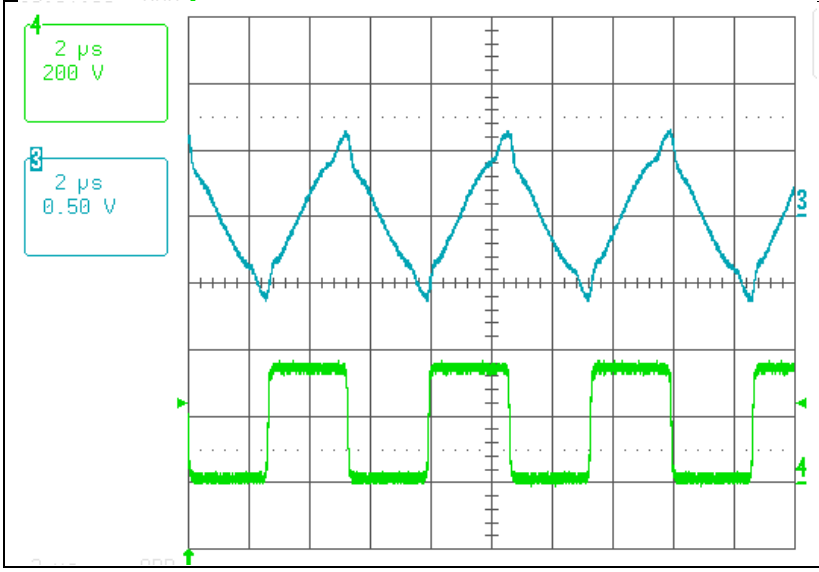
Schematic and physical structure




RECT+
V_Cres
BLK_2
1.65K
1.65K
1.65K
150pF
10R
U1
UCC25630-2DDBR
HV
VCC
BLK
FB
ISNS
VCR
BW
HS
HO
HB
RVCC
GND
LO
LL/SS
1uF
BAT20J
ES1JLW
2.5R
15R
BAS316
ZUMT718
IPL65R210CFD
470nF 1210
30uH
170uH
Lr
XFMR
V_Cres
15nF 1210
15nF 1210
2.2uF
10nF
85k
2.2nF
100R
100nF
2.2nF
40R
2.2nF
220nF
100nF 0603
1uF 0805
4.7uF 0805
10uF 1206
Signal Ground. Copper Foil on top of IC.

Waveforms

	Switching edges
	Switching jitter at 100uS delay from trigger.
	CH1 = Output ripple

	CH3 = VCR pin CH4 = Switch waveform
	CH3 = ISNS pin CH4 = Switch waveform